

ABSTRACT OF THE DISCLOSURE

A self-assembly process for preparing luminescent organic-inorganic nanocomposite thin films is disclosed. A homogeneous solution in water and an organic solvent is obtained containing a soluble silicate, a silica coupling agent, a surfactant, and an organic material having a hole transport, electron transport, and/or emissive material moiety. The silica coupling agent is selected to chemically react with the organic material. A film of the homogeneous solution is deposited onto a substrate. Preferentially evaporating the organic solvent enriches the concentration of water and non-volatile solution components to promote micelle formation. Organic materials migrate into the hydrophobic portion of the forming micelles. Continued evaporation promotes self-assembly of the micelles into interfacially organized liquid crystalline mesophases. Reacting the organic material and silica coupling forms a nanostructure self-assembly. Luminescent ordered nanocomposite structures prepared by the process, and organic-inorganic HLED devices fabricated from the luminescent organic-inorganic nanocomposite structures are disclosed.